

passed the boat, which rose and fell to them as they swept on. Ahead was the small island near the north-west entrance to Oban Harbour; Kerrera Island was close on the right or star-board bow. The sea was so calm, there was no sign of wash on either shore. As the wave rolled in I watched it, and after a few seconds the white line of surf became visible and the noise of the same following told of its breaking on the rocks with some violence. It was not the wash of any steamer, as the boatman at first unthinkingly surmised, for in the first place it was too broad a dome of water, many of our boat's lengths, into which the few short waves even of the largest steamers could not resolve themselves; secondly, there was no steamer in sight, nor had any lately gone by, save the Duke of Argyll's steam yacht, which had passed near us more than half an hour previously.

Such a wave could not have originated in the narrow channel between Mull and the mainland, but must have come in from the Atlantic, and had its origin, I imagine, in some far distant submarine disturbance. I have seen a report in the papers of an earthquake in Jersey, and I am informed by some friends lately returned from Cornwall (near St. Michael's Mount), that on August 26, about 4 p.m., when watching a seine net being pulled ashore, a wave larger than usual—described as a long black line, seen for a long time—rolled in. Perhaps others may have noted similar waves at other parts of the coast, and been able to record the exact time.

H. H. GODWIN-AUSTEN

Deepdale, Reigate, September 9

Salmon-Breeding

ON August 28 an examination was made at Lord Lauderdale's fish-rearing ponds at Howietoun into the condition of the young salmon and hybrid Salmonideæ, and with the following interesting results:—

A hybrid was taken from Pond No. 3 which measured 6.5 inches in length; it was one of about 190, all much the same size, which were raised from the eggs of the Lochleven trout fertilised from the milt of the American char, *Salmo fontinalis*, on November 15, 1882. The specimen was a male with the milt nearly fully developed; the fish would evidently have bred this winter.

A hybrid was removed from Pond No. 4 which measured 7.5 inches in length; it was one of about 90, and raised from the ova of the American char milted from a Scotch char from Loch Rannock on November 15, 1882. It also was a male with the milt as fully developed as in the preceding hybrid.

Segregation in these ponds has been most rigidly carried out, and the results show that trout and char, or two species of char, will interbreed and give fertile offspring. A few more months will decide whether the females are as forward as the males, and whether the milt itself is prolific or not so; also to what extent hybrids will interbreed.

A hybrid was removed from the Octagon Pond at Craigend which measured 6.5 inches in length; it was one of 212, and raised from the ova of the Lochleven trout, fertilised by salmon milt on December 24, 1881. It was a barren female; whether any will be fertile time will show.

A grilse was taken from the salmon pond at Howietoun which measured fourteen inches in length; there are a large number, but they are in too deep water to count. These fish were raised from the ova and milt of pure salmon taken from the Teith in December, 1880. The specimen was a female, with the ova well advanced, being 0.1 inch in diameter, and would have bred this season. This fish was well nourished, with eleven rows of scales between the adipose dorsal and the lateral line, and sixty caecal appendages. This solves the question that our salmon may not only be reared in a healthy state in suitable ponds of fresh water, but also, if properly cared for, will breed without descending to the sea. Last year the milt of the parrs from this pond were successfully used for breeding purposes.

FRANCIS DAY

Hydrodictyon in the Eastern Counties

IT may interest some of your readers to know that *Hydrodictyon utriculatum* (Roth), reckoned by Dillwyn among the rarest of the fresh-water Algae, and now generally described as confined to the ditches and pools of the Midland and Southern Counties of England (W. J. Hooker, 1833; Harvey, 1841; Hassall, 1845; and Griffith's "Micrographical Dictionary," 1883), can again be claimed as an inhabitant of the Eastern

Counties. A few days ago I found a fine and well-grown specimen in the river just above the well known sluice at Denver.

In the earlier half of the present century Cambridge seems to have been the centre for its distribution. Dillwyn, in 1809, relates that he received his specimen from the pool of the old Botanic Garden. Harvey, in 1841, says that he has fine specimens from Prof. Henslow, gathered in a pond in the Botanic Garden at Cambridge, where the plant has existed for many years. Hassall, in 1845, repeats Harvey's words, again on the authority of Prof. Henslow. Since that time it appears to have become completely extinct in this neighbourhood. The Curator tells me that two or three years back an attempt was made to introduce it into the pond of the new Botanic Garden, but without success. It is, I think, therefore worthy of record that this remarkable plant, so interesting to the biologist, has been lately discovered, apparently naturalised, at the bottom of the Ten Mile River, about twenty yards from the tidal waters of the Ouse.

The reappearance of *Hydrodictyon* on the fens round Cambridge is also interesting from the hope it inspires that, owing to the increased facilities for investigation now afforded by the University, further light may be thrown upon its singular cycle of development which, notwithstanding the labours of Areschoug, Cohn, Pringsheim, and others, must be said to be still somewhat obscure.

J. C. SAUNDERS

Downing College, Cambridge, September 4

The Sky-Glows

THE sun-glow phenomena have entered upon such a fresh phase that I venture to send some extracts from my notes. It is not simply a renewal of the sunsets of last season, although that in itself will doubtless seem remarkable to those who have not noticed the almost constant occurrence of the "day glows" throughout the summer; the chief point is the radiating character.

September 11.—Glow 6.50 p.m. At 7 a vertical bar 2° to 3° across at base, to altitude 20°. Another at angle 45° to north; at 7.3 a third at angle 30° to north. The three faded at 7.5, 7.7, and 7.10.

September 12.—Sun seen to set by 6.20. At 6.35 ruddy tint above earth shadow in east; gone at 6.45. 6.50, fine glow from north-west to south-west, up to 30°; 6.55, very fine, up to 35°; much purple. Gradual change to low orange glow by 7.4, this fading by degrees, but partial return at 7.9; little left at 7.19.

September 13 (sunrise).—4.57 a.m., lovely orange glow and reflection in west. Cirri bright. 5.0, pink shot up vertically (in inverted pyramid) to height of Jupiter. 5.03, bar at angle of 45° to north. 5.5, whole north-east to south-east suffused, broken by dark bars, four to north, five to south, radiating from sun. Central mass now 5° to 10° above Jupiter. Cirri now dark at east, but slight tint near Venus (these proved to be higher and more feathery, the others about 7° or 8° above east by north, approaching to cirro-strati). 5.7, now five bars to north, seven to south. Light wider spread, now to level of Venus (roughly measured as 35°). Soon traces even to 45°. Bars very marked; one from east-north-east reaches north-north-east, at altitude about 22°. Low cirri now re-lit. 5.15, whole mass now barred; nine to north, and two new ones to south of centre, but lower part to south now gone. Cloud over Venus now re-lit. 5.20, going to west window find marked counter-glow, also barred, radiating from perspective just like bands of cirrus, yet marvellously clear sky. Four dark bands to south, five to north, wider than those seen in east, and definition much less distinct. Rosy tints now gone. A ruddy tinge almost from south to north above earth-shadow, except just south of due west, whence rose a broad dark vertical bar. Faint cirri to south now lit up. 5.28, bars to north and south still visible, and no glow above earth-shadow at anti-solar point. Glow lasting at 5.30. Cirri in east quite dark again, but the cirri near Venus and to south white. Former now in vertical lines, but upper edges blown in wisps towards north. 5.40, stratus low in east by south. A greenish cast given to Venus and Jupiter when the glow strongest. Rosy glow at times noticed during the day. Sun rose about 5.50.

Sun set before 6.20.—6.35, ruddy tinge along east horizon, keeping above earth-shadow as it ascends. 6.45, cirro-stratus 5° to 10° above horizon, due west again lit up bright (first at 6.30) for two or three minutes, quickly followed by rosy glow in clear sky, as three central bands, divided by narrow dark bars,

and corresponding to the single mass on the 11th. 6.53, seven bands to south, a fine trio at an angle of 45° , five to north, much less distinct. No sign now of counter-glow. 6.55, orange next horizon; bars to south as bright as the vertical mass. 6.58, all fading; at no time reached beyond 25° altitude. 7.1, only the bases left of five bars to south, three vertical, and three to north. Positions show well the place of the sun below the horizon. 7.3, rose tints quite gone; none of last night's purple at all. 7.6, the cirro-stratus again tinged at edges. 7.9, as orange fades, last vestige of bars goes; stratus forming; the cirro-stratus still lit up. Sky very clear for York; none of the hazy clouds which accompanied the glows last season. 7.15, still red tinge along horizon.

September 14, morning, 5.7.—Find sky bright on waking; rose above, orange to greenish, yellow below; orange most marked, but rose wider spread, involving Venus, which, with Jupiter and moon, showed complementary effect. Only one dark bar, low down to north. Coloured area increased up to 5.15; fairly bright at 5.20; perceptible at 5.25. Counter-glow very marked at 5.20, massed above earth-shadow at anti-solar point, just where, yesterday, there was no ruddy tinge. No cirri about, only light scud low down to east, from north to south. Very clear.

This evening (14th) scud covered the sky a little before 7, and, so far as I know, nothing special was observable. Is it possible that the bars were due to shadows thrown by cirri below the horizon?

J. EDMUND CLARK

Bootham, York, September 14

THE following observations of the warm, yellow circle about the sun, unusual colours of sky and cloud, &c., may interest some of your readers just now. The beautiful, warm, yellow solar halo, silvery white within, was seen on the following dates, usually a little before, during, or after sunset:—May 18, 19, 24; June 11, 25, 26, 27; August 14, 19, 24, 27, 29; September 1, 3, 4, 5. On two occasions, in cloudless sky, the halo was visible from noon to sunset. Unusual and beautiful colours were seen near the sun on August 24, at 3 p.m., September 1, 3, and 5. These colours were first noticed at 2 p.m., November 26, 1883. The extraordinary sunsets began here in November 1883; the dates are as follows:—

1883.—November 6, 14, 25, 28; December 1, 3, 4, 5, 11, 15, 16, 17, 18, 19, 22.

1884.—January 5, 11, 15; February 15, 24.

The colours at sunrise were very fine on November 4, 29, and December 4, 9, 19, 1883; January 12 and February 9, 1884.

J. GLEDHILL

Mr. Edward Crossley's Observatory, Bermerside,
Halifax, September 10

EVEN last evening the glow was very marked. At 5.6 a belt of orange-colour lay on the horizon near the point of sunset, having a breadth of $4'$. From this base shot up the bluish-white cone, while on each side (south-west and north-west and skirting the horizon) the sky had a smoky-brown aspect. The whole was overtopped by an arch of a pale smoky-pink hue, the outer circumference of which reached an altitude of about 30° as measured from the horizon. At 5.8 the bluish-white cone had become more intense, and the eastern sky was of a pale green. At 5.12 the bluish-white cone, with brown sides and orange base, was very distinct. At 5.14 I noted a long ellipse of intensely blue sky, the meridian forming its major diameter. On each side, west and east, were areas of bluish-white, the latter apparently being a reflection of the former, and having a base on the eastern horizon of dull greenish-brown. At 5.21 I examined the sunset sky with the spectroscope. The low sun-band was becoming dark; the merest possible vapour shading appeared, detached, to the left of D, the little "c" lines were clear, and B (dry gas) intense. At 5.31 the low sun-band had become much deeper. By 5.38 a secondary glow had appeared: pale lemon extended for some 7° , overtopped for the next 20° by an intense smoky-pink, the opposite sky being a dull green, while that immediately above the horizon south-west and north was brown, and the landscape was tinted with a warm glow. The little "a" band was now intense, so also was the low sun-band, and all trace of vapour effects to the left of D had vanished. At 5.43 the glow was "settling down" and had a total extension of some 14° , 7° of orange and 7° of green. The whole thing finished off with a belt of pale sea-green about 10° in diameter shortly after 6 o'clock.

I have taken a great number of observations *in re* since my arrival in Australia last December, and am now collating them in accordance with the request of the Editor of NATURE (vol. xxix. p. 157). In a word, I am at present strongly in favour of the volcanic hypothesis, and claim to have sufficiently shown in a paper recently delivered before the Royal Society of South Australia that the relatively high pressure prevailing over the low pressure of Southern Asia at the time of the eruption prevented the dust from reaching India, so as to produce the effects of the "glow," until the lapse of a fortnight, and that the dust travelled westwards and southwards aided by the rapid equatorial rotation of the earth and the vertical distribution of pressure in oceanic regions south of the Line.

CLEMENT L. WRAGGE

Torrens Observatory, near Adelaide, July 31

P.S.—I have repeatedly observed the "glow" in broad daylight, and it is now (noon) visible as a bluish-white glare.—C. L. W.

LAST year, when staying at this place, I was much struck by the clearness of the air, the deep blue of the sky, and steadiness of the stars. Moreover I used to notice on every clear day that the highest cirri, when near the sun, exhibited very beautiful spectrum colours. They did not behave as I have seen them behave once or twice in England, viz. take up all the colours in regular succession as their angular distance from the sun altered; but each cloud exhibited the colours in an apparently irregular manner that reminded one of the appearance of mother-of-pearl. This year it seems to me that the air is of a less deep blue, and on every clear day there has been a very marked reddish glow all round the sun. This red glow in the midst of what would otherwise be a pure blue sky has been very noticeable. It has nearly, though not quite, "swamped" the diffraction colours spoken of as so remarkable last year. W. LARDEN

Avolla, Sion, Canton Valais, Switzerland (about 6500 feet)

Pipe-Clay

I WAS forcibly struck the other day by the analogy between the beds of plastic clay (called here pipe-clay) which are everywhere met with interstratified with the different drifts of wash-dirt, river-sand, &c., in the tin-mines about this country, and what was then to be seen in our own mine here. The mine had been under water for about a month. On pumping the water out, we discovered a layer of particularly fine, soft mud, four inches in depth, of about the consistency of cream. It is evident that any animal or vegetable substance dropping into this layer would sink through it and rest on the bottom. The pipe-clay contains no fossils except portions of trees which rest on the bed beneath it. Now, from the evidence before me here, I am led to the conclusion that the beds of pipe-clay were formed under like circumstances as these. The old torrents which brought the drift down from the mountains were undoubtedly continually changing their paths as they traversed the valleys, being dammed by accumulations of timber and boulders, thus causing the diversified and mixed-up appearance of the beds, some of them containing huge trees and heavy stones: these are the beds which contain the richest deposits of tin ores, others being beds of fine quartz sand, with beds of materials graduated between the two descriptions, and the beds of pipe-clay interspersed. These last vary considerably in depth. I have seen them all thicknesses between one inch and twenty feet.

The beds containing heavy materials were undoubtedly brought down by tremendous torrents caused by heavy rain-falls; the lighter materials by the shrunken torrents during dry seasons, or from a diversion of the course of the main stream. If this is the case—and it seems to me most probable—I think that it is a fair deduction to say that the pipe-clay was deposited in ponds left by the decreasing torrents in their periodically-used channels, which ponds would probably be perfectly still water, and favourable for such a deposit, in the same way as this mine was in a position favourable for the deposit of four inches of slimy mud in a month. I am at a loss to account for the fact that these beds (of finer materials) do not contain any animal remains. The heavy beds contain very much heavy timber, but of course all smaller and more delicate animal or vegetable remains would be smashed up here: this does not, however, apply to the other beds, if my theory is correct, and yet no